CALDER WATER ASSOCIATION (PWSNO 1400010)
SOURCE WATER ASSESSMENT REPORT

February 24, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for the Calder Water Association*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

A 90-foot deep well pumping from an alluvial aquifer paralleling the St Joe River supplies drinking water for the Calder Water Association. The water system serves a population of 100 people in an unincorporated town about 25 miles east of St. Maries, Idaho. The well was drilled in 1968. Historically, Calder Water Association has had few water quality problems. A ground water susceptibility analysis conducted by DEQ January 2, 2003 found the well to be moderately susceptible to all classes of regulated contaminants, mostly because of risk factors associated with local geology.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

The Calder Water Association already has some important drinking water protections in place. The system is well run and mostly in compliance with the *Idaho Rules for Public Drinking Water Systems*. The wellhead is located inside a locked pump house surrounded by a fence. There a few potential contaminant sites documented inside the Calder well recharge zone.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CALDER WATER ASSOCIATION

Section 1. Introduction - Basis for Assessment

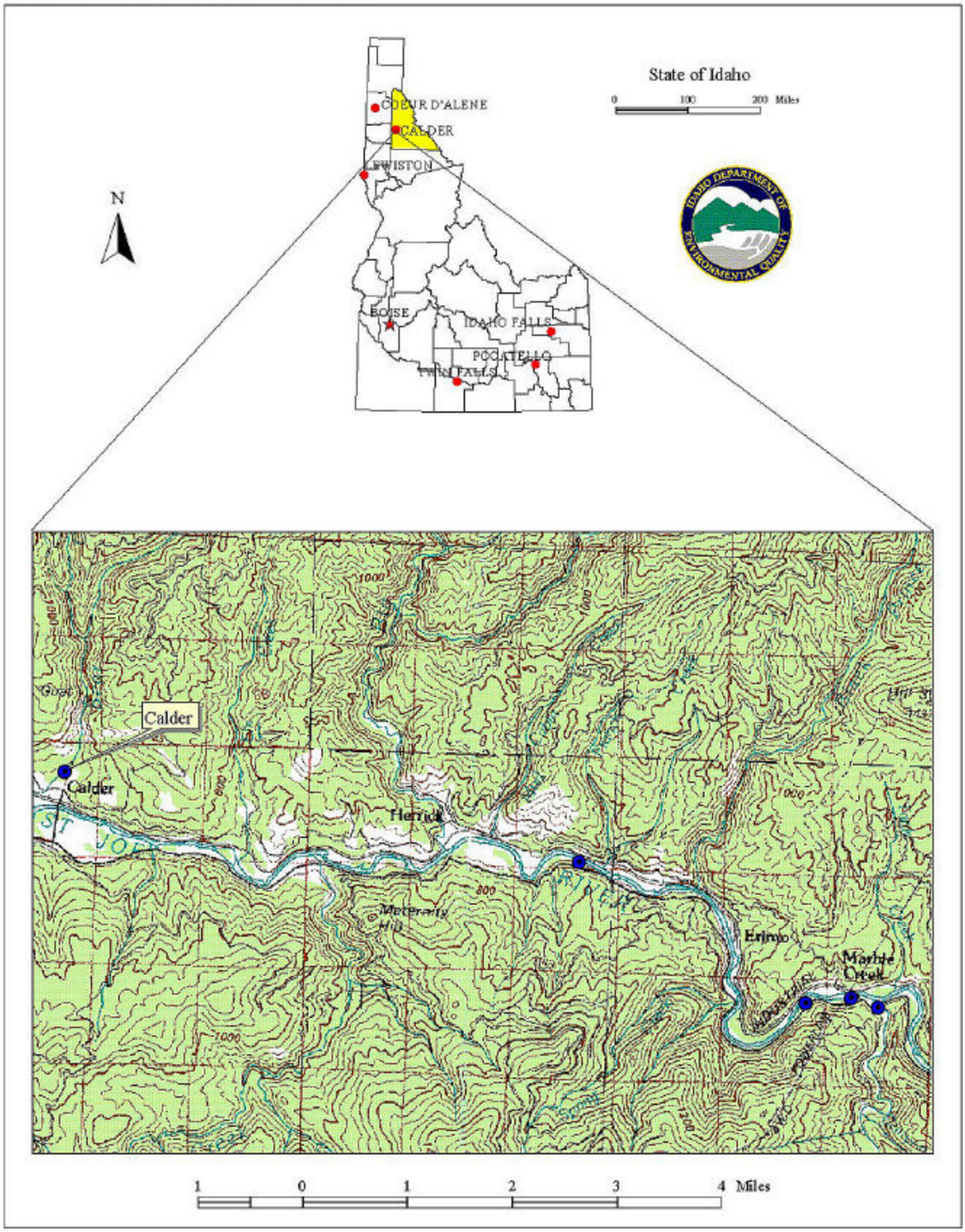
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Calder



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. The computer model used data assimilated by DEQ from a variety of sources including the local well logs and pumping volume estimates for the Calder Water Association well.

Calder Water Association is a community water system with 62 connections serving a population of 100 people in an unincorporated town north of the St. Joe River about 25 miles east of St. Maries, Idaho (Figure 1). A 90-foot deep well located in the Bear Creek drainage just north of town supplies water for domestic use and fire protection. At the present time, the well is pumping 57 gallons per minute to the reservoir. When the well was developed in 1995, the driller estimated a production capacity of 150 gallons per minute.

The source water assessment delineation for the Calder Water Association well encompasses about 1150 acres and is divided into 0-3, 3-6 and 6-10 year time of travel zones. The extent of the alluvium to the north and south of the St. Joe River established boundary conditions for the ground water flow model for the Calder Water Association well. The length of the delineation, approximately 4 miles, was determined by where the flow lines entered the river. The width was arbitrarily set as the St. Joe River to the south and the surface expression of the alluvium to the north. (Figure 2).

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process. Information from the public water system file was also incorporated into the potential contaminant inventory. The map and inventory for Calder Water Association were reviewed William C. Carter, the system operator.

Figure 2, *Calder Water Association Delineation and Potential Contaminant Inventory* on page 7 of this report shows the location of the Calder Water Association well, the zone of contribution DEQ delineated for it, and potential contaminant sites in the vicinity. The town of Calder lies inside the 0-3 year time of travel zone. Outside of the town, most of the land is undeveloped forest.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

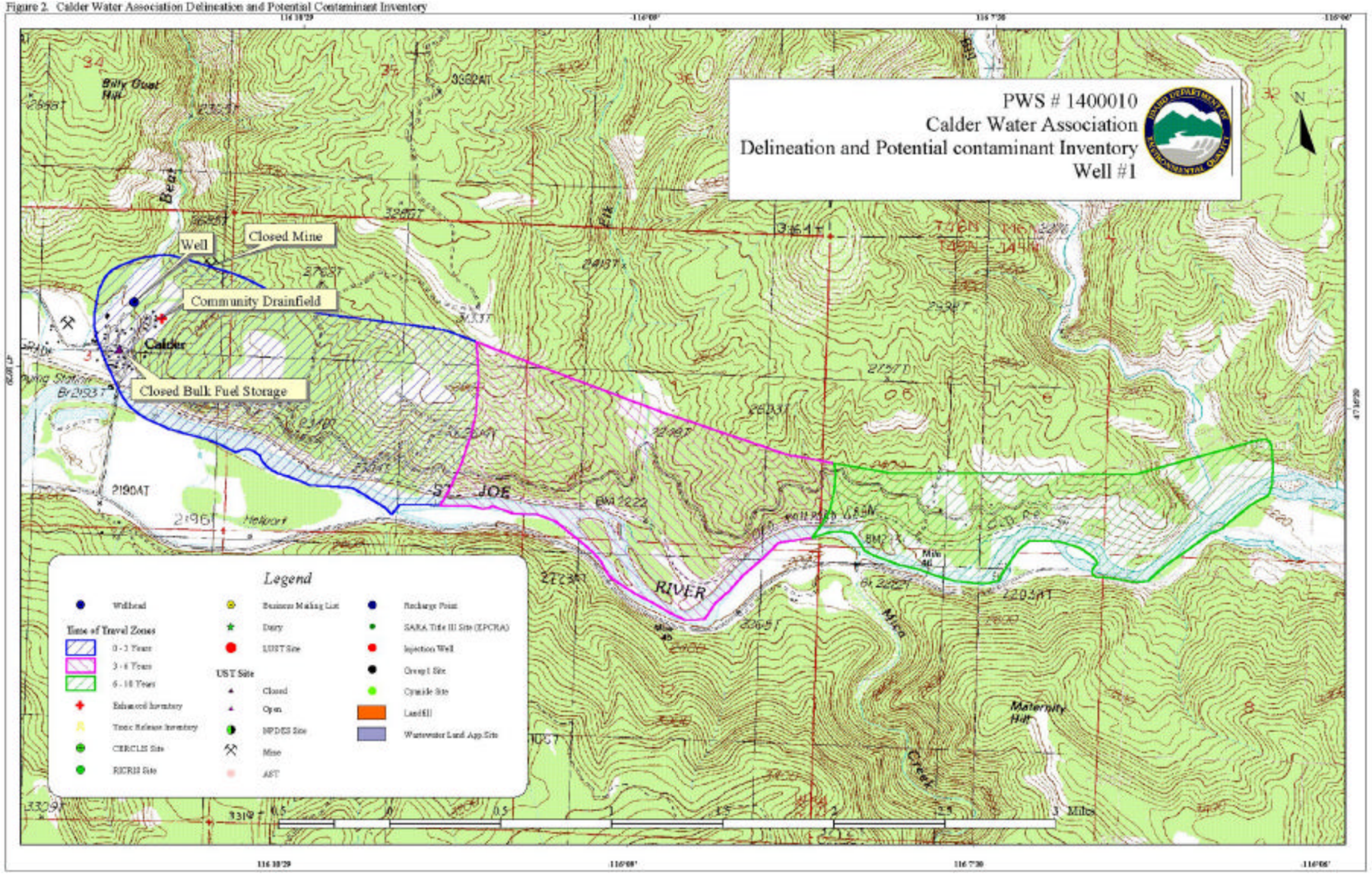
The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the Calder Water Association well, Attachment A, shows in detail how the well was scored.

Well Construction

Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. The Calder Water Association well log is on file with DEQ. No deficiencies in the wellhead and surface seal maintenance were noted during a sanitary survey in July 2001.

The Calder well was drilled in 1968. The 8-inch steel casing terminates in gravel 90 feet below the surface. The well is gravel packed, but the driller's report gives no details about the size of the gravel used or the depth where it was placed. The 18-foot deep bentonite clay surface seal terminates in a mixed clay and gravel stratum. Current Idaho Department of Water Resources well construction standards call for a minimum seal depth of 20 feet in unconsolidated formations. The static water level is 20 feet below land surface. The association had the well redeveolped in 1995 which increased the production and averted a shortage of water.

Figure 2. Calder Water Association Delineation and Potential Contaminant Inventory



Hydrologic Sensitivity

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The Calder Water Association well scored 6 points out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone generally are composed of moderately well to well drained alluvial materials. Soils that drain rapidly are deemed less protective of ground water than slow draining soils. At the well site, gravel mixed with clay lies above the water bearing strata, which begin at 20 feet and continue to the full depth of the well. The well is located just above the 100-year flood plain for the St. Joe River and Bear Creek. A site inspection in March 2001 determined that the well is not surface water influenced.

Potential Contaminant Sources and Land Use

Figure 2, *Calder Water Association Delineation and Potential Contaminant Inventory* on page 7 shows the location of the Calder Water Association well, and the zone of contribution DEQ delineated for it. The town of Calder lies inside the 0-3 year time of travel zone. Homes in the town are connected to a community sewer system with drainfields located on the hillside south east of the well. The location of this drainfield, more than 500 feet from the well, greatly exceeds the minimum separation distance required .between a public water supply and drainfield. It is a cause of concern to the town because it has surfaced in the past during wet springs. The county shop and bulk fuel storage tank have been moved about 11 miles up river. The mine northeast of the well did not have milling facilities and has not operated for about 20 years.

A drinking water monitoring waiver application in the public drinking water system file for Calder notes the presence of an abandoned land fill about 2 miles east of the well. The exact location relative to the well is not shown on the map, but a site this distance from the well and on the north side of the river would fall inside the 3-6 year time of travel zone delineated for the Calder well.

Historic Water Quality

Calder Water Association has had few water quality problems. In the period from January 1998 through December 2002, all monthly tests for total coliform bacteria were negative. 19 µg/l of dichloromethane, a common paint solvent, were detected in a volatile organic chemical test in May 2000. When the water was retested in July dichloromethane, was not detected. This indicates a sampling error rather than contamination of the ground water itself. Chemical sampling results for Calder are summarized on the table below.

Table 1. Calder Water Association Chemical Sampling Results

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	ND	12/11/95, 11/5/98	Nitrate	10	ND to 0.073	4/4/80 to 6/7/02
Arsenic	0.01	ND	4/4/80, 11/5/98	Nickel	N/A	ND	12/11/95, 11/5/98
Barium	2	ND 0.02	411/5/98/4/80, 12/11/95	Selenium	0.05	ND	4/4/80, 12/11/95, 11/5/98
Beryllium	0.004	ND	12/11/95, 11/5/98	Sodium	N/A	8.07 to 11.0	12/18/84 to 6/18/01
Cadmium	0.005	ND	4/4/80, 12/11/95, 11/5/98	Thallium	0.002	ND	12/11/95, 11/5/98
Chromium	0.1	ND	4/4/80, 12/11/95, 11/5/98	Cyanide	0.02	ND	12/11/95
Mercury	0.002	ND	4/4/80, 12/11/95, 11/5/98	Fluoride	4.0	ND to 0.4	4/4/80 to 6/18/01

Secondary and Other IOC Contaminants (Optional Tests)			
Contaminant	Recommended Maximum (mg/l)	Results (mg/l)	Dates
Sulfate		1.9, 1.92	11/5/98, 12/11/95

Regulated and Unregulated Synthetic Organic Chemicals		
Contaminant	Results	Dates
29 Regulated and 13 Unregulated Synthetic Organic Compounds	None Detected	9/13/93 to 5/5/00

Regulated and Unregulated Volatile Organic Chemicals		
Contaminant	Results	Dates
21 Regulated And 16 Unregulated Volatile Organic Compounds	None Detected except as noted below	9/13/93 to 5/5/00
Dichloromethane (MCL = 5.0 µg/l)	19 µg/l	5/5/00
Dichloromethane (MCL = 5.0 µg/l)	ND	9/21/93, 7/13/00

Radiological Contaminants			
Contaminant	MCL	Results	Dates
Gross Alpha, Including Ra & U	15 pC/l	0.3 to 1.1 pC/l	1/12/81 to 6/18/01
Gross Beta Particle Activity	4 mrem/year	1.3 to 2.1mrem 2.1 pC/l	1/12/81 to 12/9/97 6/18/01

Final Susceptibility Ranking

The Calder Water Association well ranked moderately susceptible to all classes of regulated contaminants. 9 of the 12 points counted against the well in the final susceptibility scores derive from risk factors related to the relative shallowness of the well and its location in an unconfined alluvial aquifer. Most of the well recharge zone is undeveloped forest with few potential contaminant sites inside its boundaries. Total scores for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 2.

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score =
   Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
2) Microbial Final Score =
   Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility

The complete Susceptibility Analysis for the Calder Water Association well can be found in Attachment A.

Table 2. Summary of Calder Water Association Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction	Hydrologic Sensitivity	Contaminant Inventory			
			IOC	VOC	SOC	Microbial
Well #1	4	6	8	8	8	4
Final Susceptibility Score/Ranking						
	IOC		VOC		SOC	Microbial
Well #1	12/Moderate		12/Moderate		12/Moderate	12/Moderate

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Calder Water Association already has some important drinking water protection measures in place. The well is located in a locked well house and the area around the well is fenced to discourage unauthorized access. The system is well run and was mostly in compliance with the Idaho Rules for Public Drinking Water Systems when it was inspected in July 2001. Maintenance items that needed improvement were repairing the concrete floor of the well house; removing brush around the reservoir roof; and repairing distribution system leaks.

A voluntary measure every system should implement is development of a water emergency response plan. There is a simple fill-in-the-blanks form available on the DEQ website to guide systems through the process.

Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Coeur d'Alene Regional DEQ Office	(208) 769-1422
State IDEQ Office	(208) 373-0502
Website:	www.deq.state.id.us/water/water1.htm

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper of the Idaho Rural Water Association (208) 343-7001for assistance with drinking water protection strategies. www.idahoruralwater.com

References Cited

Freeze, R.A., and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., 604 p.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Division of Environmental Quality, 1999, Idaho Source Water Assessment Plan, October, 39 p.

Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Theis, C.V., 1935, The Relation between Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.

Attachment A

Calder Water Association
Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **CALDER WATER ASSN** Source: **WELL #1**

Public Water System Number : **1400010** 1/2/03 9:07:21 AM

1. System Construction		SCORE			
Drill Date	7/16/68				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES 2001				
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		**4**			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		**6**			
		IOC	VOC	SOC	Microbial
3. Potential Contaminant / Land Use		Score	Score	Score	Score
Land Use Near Well	URBAN	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Sanitary Setback	NO	NO	NO	NO	NO
Potential Contaminant Source/Land Use Score -		**2**	**2**	**2**	**2**
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	Community drainfield, closed bulk fuel storage	1	1	1	1
(Score = # Sources X 2) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		**3**	**3**	**3**	**2**
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	YES. Abandoned Landfill	2	2	2	
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		**3**	**3**	**3**	**0**
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		**0**	**0**	**0**	**0**
Cumulative Potential Contaminant / Land Use Score		**8**	**8**	**8**	**4**
4. Final Susceptibility Source Score		**12**	**12**	**12**	**12**
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

POTENTIAL CONTAMINANT INVENTORY
List of Acronyms and Definitions

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ? Superfund? is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.